

## Resource Evaluation Report

# Geological & Geophysical Data Acquisition

Outer Continental Shelf  
Through 2016

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## Abbreviations

AVO	Amplitude Variation with Offset data
BOEM	Bureau of Ocean Energy Management
BSEE	Bureau of Safety and Environmental Enforcement
CDP	Common Depth Point Seismic Data
CFR	Code of Federal Regulations
COST	Continental Offshore Stratigraphic Test
CSEM	Controlled Source Electromagnetic survey
DOI	Department of the Interior
DST	Deep Stratigraphic Test (well)
FY	Fiscal Year
G&G	Geological and Geophysical
GOM	Gulf of Mexico
GRAV	Gravity Data
HRD	High-Resolution seismic Data
MAG	Magnetic Data
MMS	Minerals Management Service
OBS	Ocean Bottom Seismometers
OCS	Outer Continental Shelf
OCSLA	Outer Continental Shelf Lands Act
RE	Resource Evaluation
REP	Resource Evaluation Program
SEG	Society of Exploration Geophysicists
4-C	Four Component Seismic Data
2-D	Two-Dimensional Seismic Data
3-D	Three-Dimensional Seismic Data
4-D	Four-Dimensional Seismic Data

## Introduction

This report addresses the general role of the Bureau of Ocean Energy Management's (BOEM) Resource Evaluation Program (REP) in geological and geophysical (G&G) data acquisition and permitting activities.

With regard to the REP, BOEM's regulations at 30 CFR Part 551 govern the process for prelease G&G exploration for oil, gas, and sulphur resources on the OCS. Part 551 applies not only to G&G exploration but to scientific research as well. The purpose of these regulations is to prescribe (1) when a permit or the filing of a notice is required to conduct G&G activities on the OCS and (2) operating procedures for conducting exploration, as well as requirements for disclosing data and information, conditions for reimbursing permittees for certain costs, and other conditions under which exploration shall be conducted. Similar regulations addressing prelease prospecting activities for minerals other than oil, gas, or sulphur can be found in 30 CFR Part 580.

In this report, the totals for permits issued, mileage acquired, and expenditures may have been influenced by overall trends of oil and gas prices, access limitation for OCS acreage due to legislative and presidential moratoria, and the shift of industry investment to international opportunities.

deep stratigraphic test.” Three COST wells have encountered hydrocarbons: the COST B-3 (Atlantic), Point Conception No.1 (California), and the Norton COST No. 2 (Alaska). A discussion of the deep stratigraphic test program is described by Dellagiarino (1991) in OCS Report # MMS-90-0028.

## **G&G Data Release**

Regulations at 30 CFR § 551.14(b)(1) and § 550.197 provide the release times of proprietary G&G data and information. Prelease geophysical information will not be released to the public for 25 years; raw geophysical data is held for 50 years before it is released to the public. The proprietary term for geological information is 10 years. The first geophysical data sets were released in 2001, which included data sets from southern Alaska, the Arctic, the Bering Sea, Southern California through Washington/ Oregon, the North, Mid, and South Atlantic planning areas, and in Eastern, Central, and Western GOM areas. The proprietary term for a COST well is 25 years or, if a lease sale is held in the area, 60 days after the issuance of a lease within 50 geographic miles of the test. The actual data may be searched for and downloaded at the National Archive of Marine Seismic Surveys (NAMSS) <https://walrus.wr.usgs.gov/NAMSS/>. Also additional information can be found at the BOEM regional homepage at <http://www.boem.gov/BOEM-Regions/>.

## **Analysis of Present BOEM Data Coverage on the OCS**

### ***Mileage/Blocks***

A leading indicator of the amount of OCS oil and gas activity is the number and associated mileage of prelease exploration permits that BOEM issues to industry each year. Table 1 shows the 2-D seismic data coverage, by region and planning area that BOEM has in its inventory. The grid coverage is not uniform over the planning areas. Tables 2, 3, and 4 summarize BOEM data acquisitions through 2016. It should be noted that 3-D seismic information, which is reported as coverage of OCS blocks, in the BOEM inventory is comparable to the 2-D holdings in that 308,000 blocks of 3-D information compares favorably to about 3.1 million line miles of conventional 2-D seismic information.

BOEM has not acquired all of the permit data shot and recorded by industry primarily because of the data quality or the redundancy of data shot on the OCS by different companies. Since the early 1990s, BOEM, as well as industry, have increased its acquisition of 3-D seismic data in concert with the development and use of interactive workstations. In some areas in which BOEM has previously obtained 2-D or 3-D seismic information, it continues to acquire new information that is derived from state-of-the-art acquisition methods and equipment or from previously acquired data that are reprocessed using more modern techniques.

BOEM's OCS Regions (GOM, Pacific, Alaska and Atlantic) formerly spent funds on prelease high-resolution data (HRD), as these data were acquired under exclusive contract rather

than under permit. A change in policy in 1982 altered this situation. Under the previous program, BOEM directly acquired pre-lease, tract-specific, shallow hazards data. Under the area wide leasing program, the detailed shallow hazards analysis function was shifted to the post sale phase, and the responsibility for site-specific hazards data collection was placed on the lessee as a condition to obtain an approved Exploration or Development Production Plan from BOEM and a drilling permit through the Bureau of Safety and Environmental Enforcement (BSEE). If industry continues to conduct prelease hazards surveys, G&G permits must be obtained from BOEM. Shallow hazards survey data and information are available to BOEM and BSEE under terms of permit or lease and regulations.

### ***Geological and/or Geophysical Exploration Permits***

Another important indicator of OCS oil and gas activity is the number of permits issued and the areas for which the permits are issued. On average, BOEM has issued approximately 220 permits per year. The greatest number for one year was 574 in 1983.

Table 5 presents the statistics of G&G exploration permitting for the OCS since 1960, with a differentiation between geological permits and geophysical permits from 1969 to 2016.

BOEM tracks G&G permits by calendar year. (Tables A-2, A-6, A-10, and A-14 show total permits per Region.) They demonstrate that most OCS oil and gas activity has been in the GOM. The GOM has issued 83 percent of all permits and is followed by the Alaska Region with 8 percent. The Pacific Region has issued 6 percent of the permits, followed by the Atlantic Region with about 2 percent.

It should be noted that since 1969, approximately 94 percent of the permits issued were for geophysical exploration and that geological exploration permits accounted for only 5 percent. While the total number of 3-D permits compared to all permits issued is rather small (11 percent) when compared with the total geophysical permits issued, over the past 10 years, 185 3-D permits have averaged 32 percent of geophysical permits during that period. Permits for deep stratigraphic test wells or COST wells make up about 5 percent of all geological permits.

Permitting for all Regions has declined since the number of permits peaked in 1983. Some regional differences can be detected that are related to leasing moratoria, operating conditions such as hurricanes/arctic ice, and the discovery of new hydrocarbon plays.

### ***Expenditures***

BOEM records financial and procurement transactions by fiscal year (FY). All figures and tables involving the BOEM data acquisition from permittees are based on a fiscal year that begins on October 1 and extends through the following September 30.

Tables 6 and 7 show the total expenditures for G&G data since 1968 for those data presented in Table 4. Tables 6 and 7 show the distribution of G&G expenditures by Region. The GOM and Alaska have the largest portion of the expenditures with 41 and 36 percent

respectively. Alaska has over twice the offshore area of the other three Regions combined. On the other hand, the GOM, with over 95 percent of OCS production, possesses the largest database.

The Atlantic Region (13 percent of the expenditures) and the Pacific (9 percent) are comparable. The Pacific Region has the smallest slice of the expenditures for G&G data because much of the California OCS and offshore Washington and Oregon have been under moratoria since the 1980s. The moratoria expired on September 30, 2008. The main difference between the Atlantic and Pacific Regions, according to Table 7, is the acquisition of high-resolution data in the Atlantic.

The GOM Region's dominant role in establishing the offshore industry is apparent by its acquisition of the majority of the data before 1976 and closer to 100 percent since 1990. Between 1976 and 1989, a significant portion of BOEM's G&G data acquisition budget has been expended by the Alaska Region. However, since the 1990s and up through the present as the level of activity dropped in Alaska, most of the BOEM G&G data acquisition budget has been allocated for data in the GOM.

The average cost per mile for data was high in the Alaska Region from the late 1970s into the 1990s and for the Atlantic Region in the 1980s. The Alaska Region purchased a large amount of data collected in State waters (1979 to 1990), and BOEM was required to pay full market price for this non-OCS dataset. The price varied from \$1,500 to \$6,000 per mile and is reflected in the unusually high average cost per mile shown in Table 8.

Overall, the early to mid-1980s saw a dramatic increase in expenditures by MMS, a predecessor agency to BOEM, as more reprocessed data were acquired to address area wide leasing and a more aggressive proposed Five-Year OCS leasing schedule. However, due to regulatory changes in reimbursement procedures in 1986, the cost per mile has dropped dramatically. With a moderated Five-Year Leasing Schedule and new exploration theatres worldwide, total expenditures have steadily decreased from the 1980s to the present.

## **Comparisons to Industry**

While BOEM does not acquire all industry data, it does acquire a vast majority of it. For example, BOEM has acquired approximately 90 percent of the data collected by industry on the Alaska OCS. Alaska remains a large frontier area with limited data coverage by industry, a fact that necessitates BOEM to acquire as much of these data as feasible. In recent years, while BOEM has acquired the data from most 3-D surveys and most large 2-D surveys shot in the GOMR, it has not needed to acquire the volume that industry obtains to reprocess. This is partly due to industry frequently reprocessing portions of the seismic surveys, particularly around their prospective targets.

MMS acquired more data in the Atlantic Region than industry in 1976 and 1983. Before 1976, MMS limited its acquisition of new data because industry had shown very little interest in leasing this frontier area. During the period 1976 to 1984, MMS not only acquired most of